

Miniaturized Dynamic Pressure Sensor Arrays with Sub-Millimeter (mm) Spacing for Cross-Flow Transition Measurements, Phase II

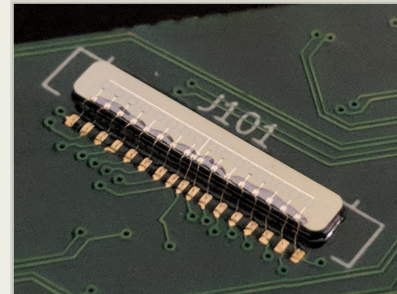
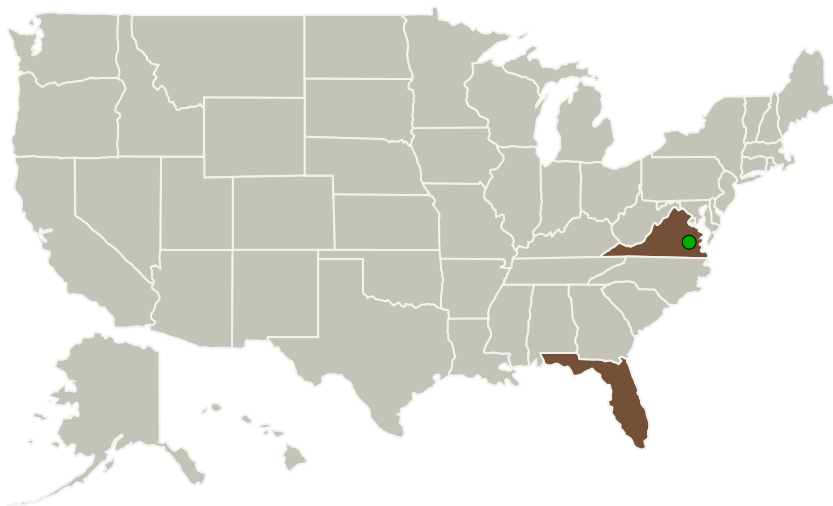
Completed Technology Project (2016 - 2019)



Project Introduction

The Interdisciplinary Consulting Corporation (IC2) and in partnership with the University of Florida (UF) propose a microfabricated, dynamic piezoelectric pressure sensor array with sub-mm spacing to enable high temporal and spatial resolution measurements of cross-flow transition in swept-wing, supersonic aircraft research. The proposal is in response to Subtopic A1.08 Ground Testing and Measurement Technologies, whereby the primary objective is "to develop innovative tools and technologies that enhance testing and measurement capabilities." More specifically, the proposed innovation addresses critically unmet measurement needs of the Commercial Supersonics Technology (CST) Project of the NASA Advanced Air Vehicles Program (AAVP). The proposed innovation is a highly miniaturized, dynamic piezoelectric pressure sensor array with sub-mm spacing for high bandwidth, high spatial resolution measurements of cross-flow transition. High-spatial resolution pressure sensors with sub-mm spacing provide a much-needed capability that does not currently exist among state-of-the-art offerings, enabling dynamic wall pressure measurement and identification of traveling and standing cross-flow modes. The proposed concept extends the basic design to high bandwidth, high-spatial resolution, dynamic pressure sensing via reduction in sensor geometry and integration of multiple sensors arrayed on a single chip. The end result is a miniaturized, highly-compact array of dynamic pressure sensors with backside contacts to enable a truly flush-mounted, smooth interface for flow measurement applications.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Interdisciplinary Consulting Corporation	Lead Organization	Industry	Gainesville, Florida
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Florida	Virginia

Project Transitions

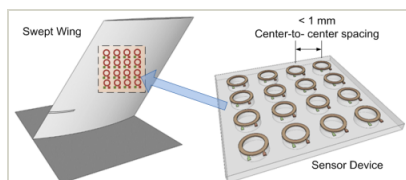
▶ **April 2016:** Project Start

✓ **July 2019:** Closed out

Closeout Documentation:

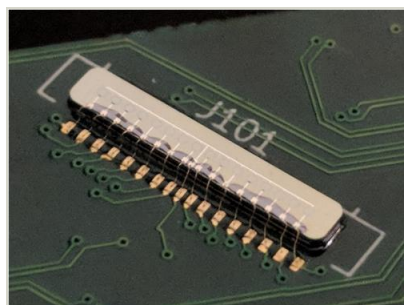
- Final Summary Chart(<https://techport.nasa.gov/file/139769>)

Images



Briefing Chart Image

Miniaturized Dynamic Pressure Sensor Arrays with Sub-Millimeter (mm) Spacing for Cross-Flow Transition Measurements, Phase II (<https://techport.nasa.gov/image/130479>)



Final Summary Chart Image

Miniaturized Dynamic Pressure Sensor Arrays with Sub-Millimeter (mm) Spacing for Cross-Flow Transition Measurements, Phase II (<https://techport.nasa.gov/image/130658>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Interdisciplinary Consulting Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Tai-an Chen

Co-Investigator:

Tai-an Chen

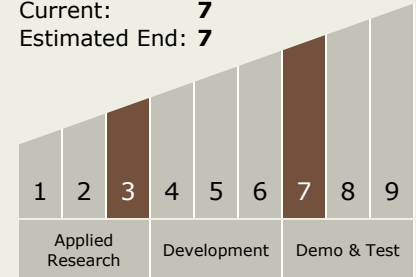
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Technology Maturity (TRL)

Start: **3**
Current: **7**
Estimated End: **7**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System